GUREVICH, A.N., kand.tekhn.nauk, SINENKO, N.P., inzh., SIMSON, A.E., kand.tekhn.nauk.

Improving the performance of idling 2D100 diesel locomotives.

Vest.TSNII WPS 19 no.2;20-24 760, (MIRA 13:6)

(Diesel locomotives)

SHISHKIN, Kirill Aleksandrovich, prof. [deceased]; GUREVICH, Abram Natanovich, kand. tekhn. nauk; STEPANOV, Aleksandr Dmitriyevich, doktor tekhn. nauk; VASIL'YEV, Vladimir Andreyevich, inzh.; SURZHIN, Sergey Nikolayevich, inzh.; KAMENETSKIY, B.G., kand. tekhn. nauk, retsenzent; MOISEYEV, G.A., inzh., retsenzent; TURIK, N.A., inzh., retsenzent; SAZONOV, A.G., inzh., red.; KHUTORYANSKIY, N.M., kand. tekhn. nauk, red.; KHITROV, P.A., tekhm. red.

[TE3 diesel locomotive] Teplovoz TE3. Izd.2., perer. Moskva, Vses. izdatel'sko-poligr. ob"edinenie M-va putei soobshcheniia, 1961.
371 p. (MIRA 14:6)

(Diesel locomotives)

SHISHKIN, Kirill Aleksandrovich, zasl. deyatel' nauki i tekhniki, prof.

[deceased]; GUREVICH, Abram Natanovich, kand. tekhn. nauk; STEPANOV, Aleksandr Dmitriyevich, Rand. tekhn. nauk; PLATONOV, Yevgeniy
Veniaminovich, kand. tekhn. nauk; BLIZNYANSKIY, Aleksandr Semenovich,
inzh.; PIRIN, I.V., kand. tekhn. nauk, retsenzent; BASENTSYAN, A.A.,
inzh., red.jzd-va; MODEL', B.I., tekhn. red.

[Soviet diesel locomotives] Sovetskie teplovozy. Izd. 4., perer. i dop. Moskva, Gos. nauchno-tekhn. izd-vo mashinostroit. lit-ry Mashgiz, 1961. 480 p. (MIRA 14:9) (Diesel locomotives)

STRUNGE, Boris Nikolayevich; MUL'MAN, Boris Yefimovich; EPSHTEYN, Abram Semenovich; GUREVICH, A.N., kand. tekhn. nauk, retsenzent; SMIR-NOVA, V.L., red. izd-va; EL'KIND, V.D., tekhn. red.

[Design of locomotive and marine engines abroad] Konstruktsii zarubezhnykh teplovoznykh i sudovykh dvigatelei. Moskva, Gos. nauchno-tekhn. izd-vo mashinostroit. lit-ry, 1961. 299 p. (MIRA 14:11)

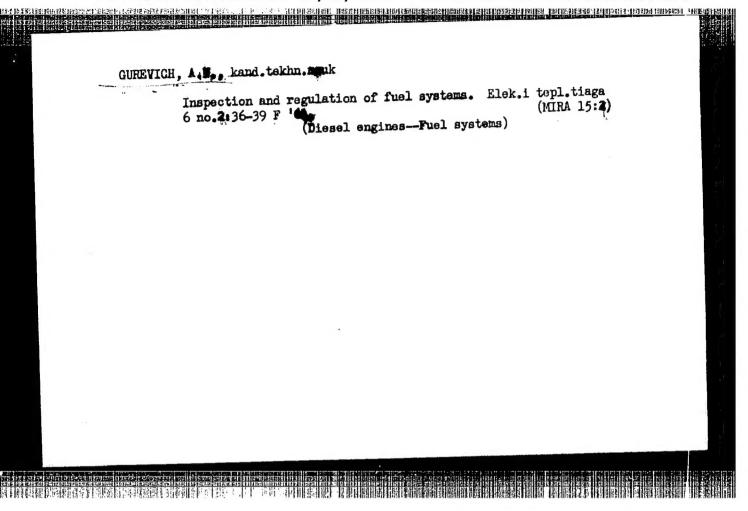
(Diesel locomotives) (Marine diesel engines)

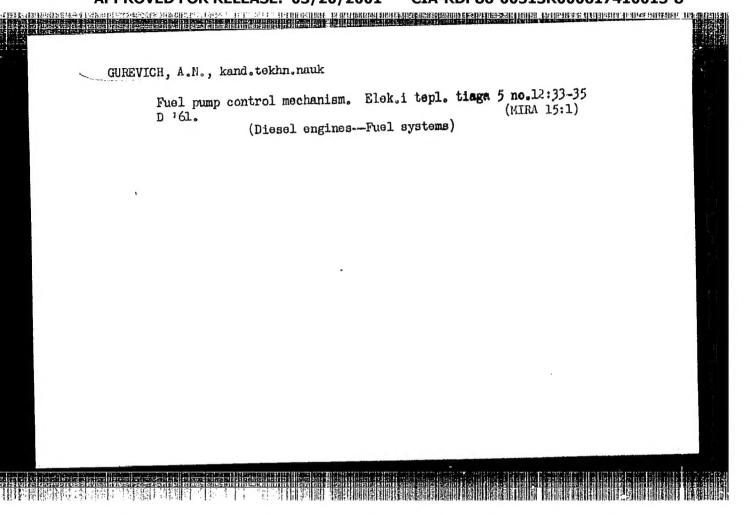
BELOUSOV, I.A., mashinist teplovoza; FOKIN, M.D., kand.tekhn.nauk; ILYUKHIN, A.A., mashinist-instruktor; GUREVICH, A.N., kand.tekhn.nauk.

Reply to the inquiries of our readers. Elek. i tepl. tiaga no.1:42-43 Ja '61. (MIRA 14:3)

l. Depo Kazalinsk Kazakhskoy dorogi (for Belousov). 2: Depo Krasnoufimsk Kazanskoy dorogi (for Ilyukhin).

(Railroads—Brakes)

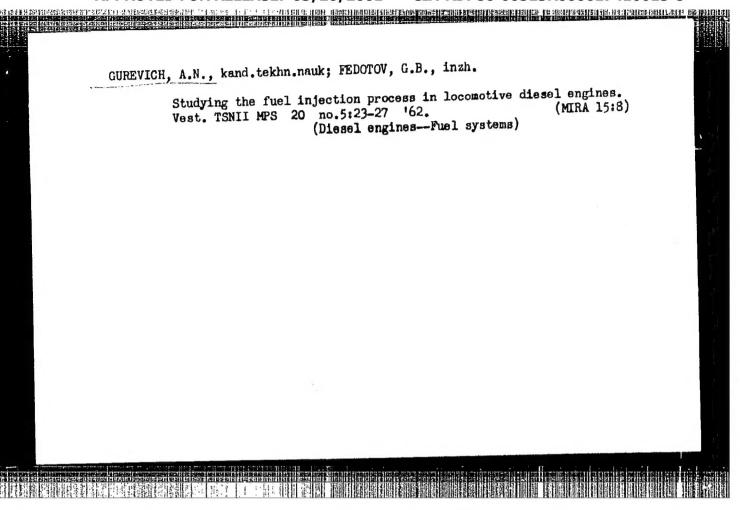




DUBROVSKIY, Z.M., inzh.; GUREVICH, A.N., kand.tekhn.nauk; KHATSKELEVICH,
M.N., inzh.

Replies to the inquiries of our readers. Elek. i tepl. tiaga
6 no.ll:42-43 N '62.
(Electric locomotives) (Diesel locomotives)

(Electric locomotives)



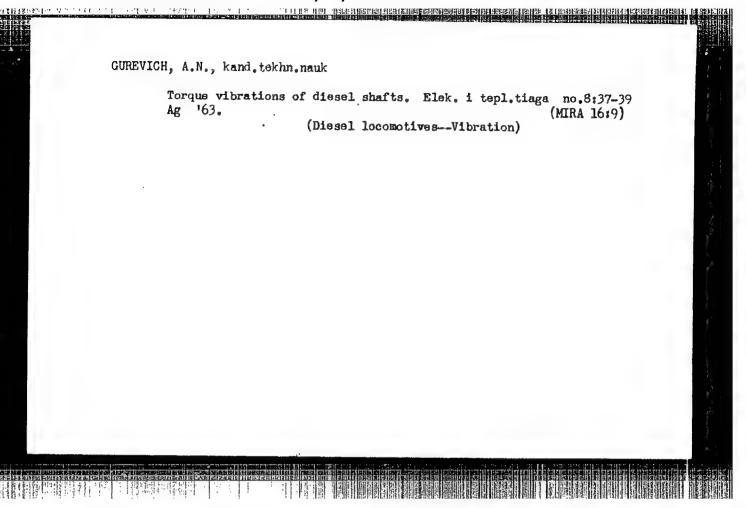
GUREVICH, A.N.; SURZHENKO, Z.I.; KLEFACH, P.T.; RUSINOV, R.V., kandtekhm. nauk, retsenzent; GALANOVA, M.S., inzh., red.;
UVAROVA, A.F., tekhm. red.

[Fuel system on diesel locomotives and motorships with ploo and D50 engines] Toplivnaia apparatura teplovoznyki i sudovykh dvigatelei tipa ploo i D50. Moskva, Mashgis, 1963.

(Diesel locomotives—Fuel system)

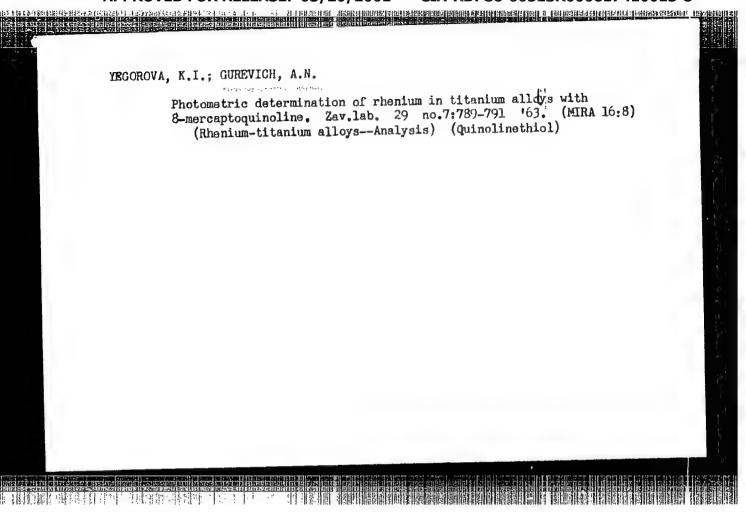
(MIRA 16:5)

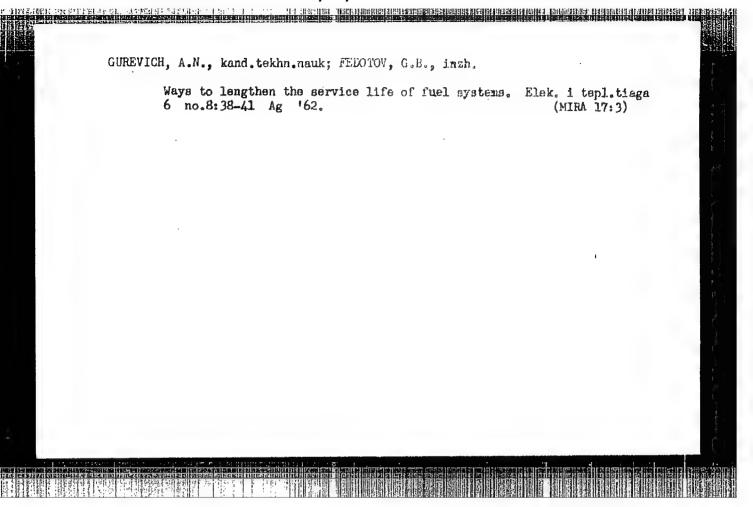
(Motorships—Fuel system)



GUREVICH, A.N., kand.tekhn.nauk; FEDOTOV, G.B., inzh.

Characteristics of the performance of the fuel system of the type Dloo diesel engine. Trudy TSNII MPS no.262:41-52 '63. (MIRA 16:10)



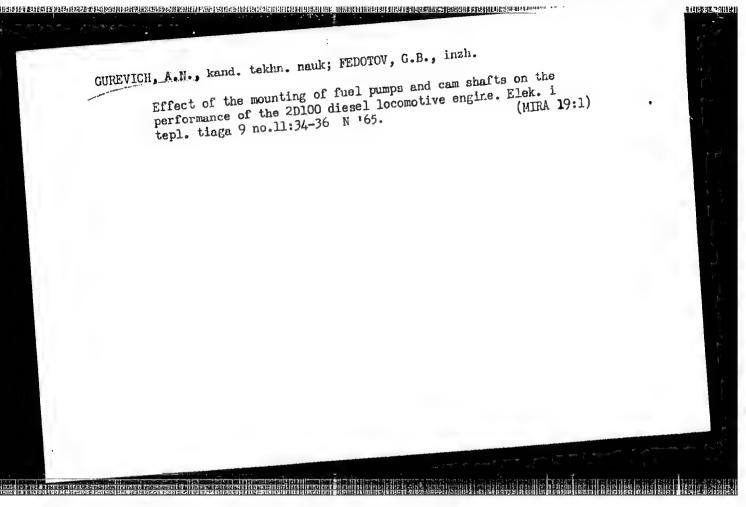


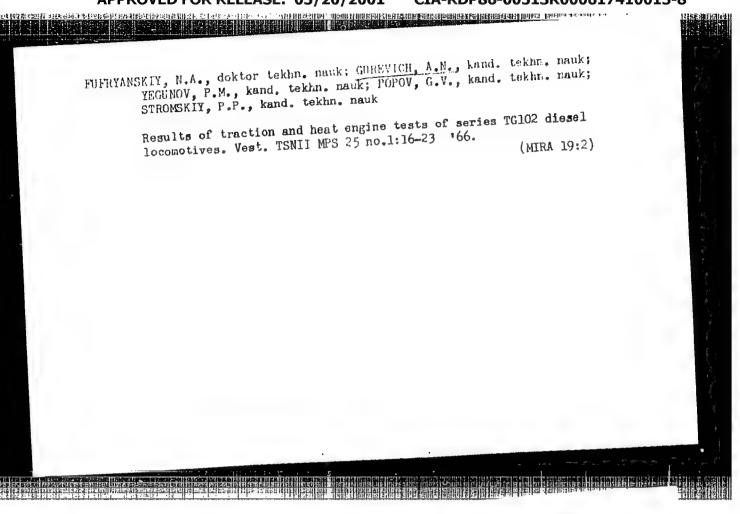
GUREVICH, A.N., kand. tekhn. nauk; MOISEYEV, G.A., inzh., retsonzent; KISELEVA, N.P., inzh., red.; BOBROVA, Ye.N., tekhn. red.

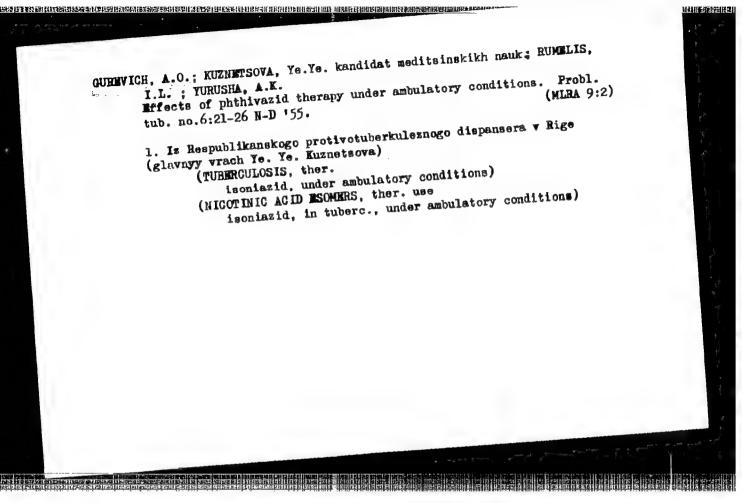
[Fuel systems of diesel locomotive engines] Toplivnaia apparatura teplovoznykh dizelei. Moskva, Transzheldorizdat, 1963. 81 p. (MIRA 17:1)

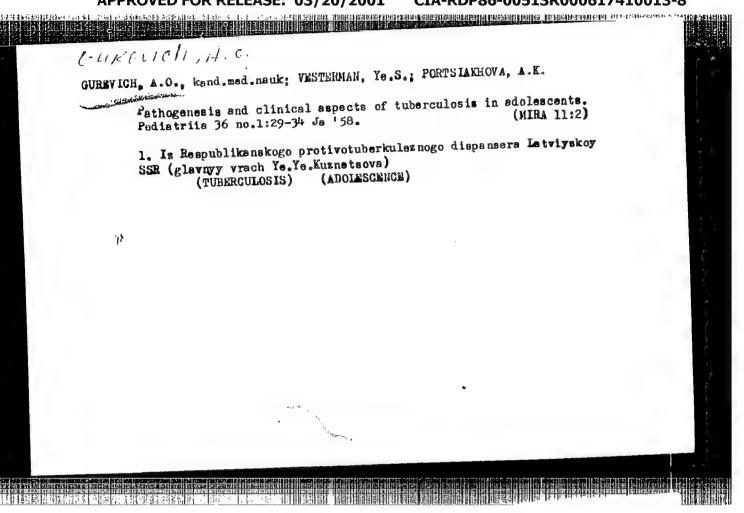
SHISHKIN, Kirill Aleksandrovich, prof.; GUREVICH, Abram Natanovich, kand. tekhn. nauk; STEPANOV, Aleksandr Dmitriyevich, doktor tekhn. nauk; VASIL'YEV, Vladimir Andreyevich, kand. tekhn. nauk; SURZHIN, Sergey Nikolayevich, inzh.; KISELEVA, N.P., red.

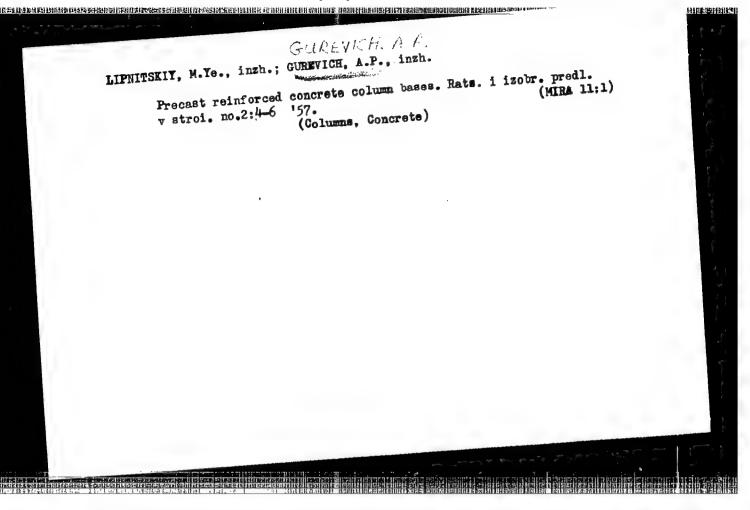
["TE3" diesel locomotive] Teplovoz TE3. Izd.3., perer.
[By] K.A.Shishkin i dr. Moskva, Transport, 1965. 411 p.
(MIRA 18:7)

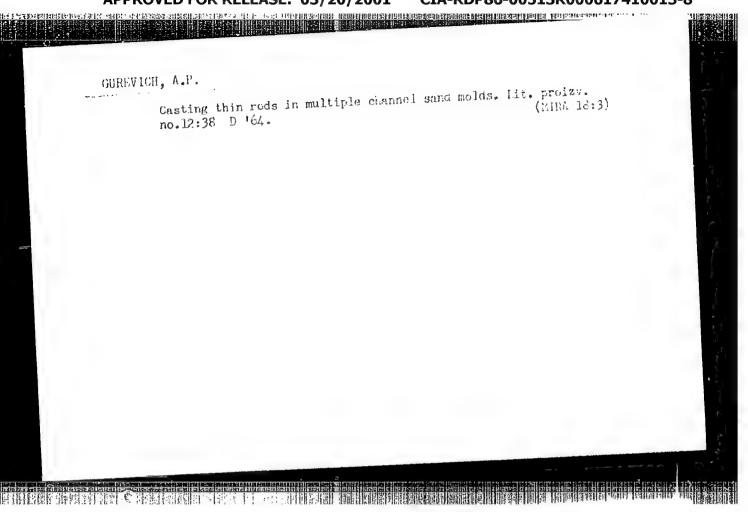


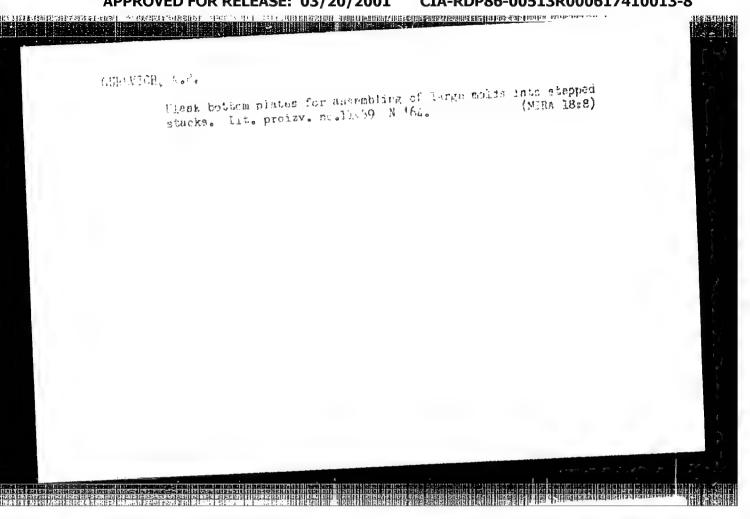












SOV/112-59-2-4142

Translation from: Referativnyy zhurnal. Elektrotekhnika, 1959, Nr 2, p 279 (USSR)

AUTHOR: Gurevich, A. S., Klement'yev, L. N., and Rozenbaum, A. M.

TITLE: Influence of Certain Changes in Design of a Single-Cord Cotton-Insulated

Wire Upon Capacitive Couplings in the Quad

(Vliyaniye nekotorykh izmeneniy konstruktsii odinochnoy zhily s kordel'nobumazhnoy izolyatsiyey na yemkostnyye svyazi chetverki)

PERIODICAL: Tr. N.-i. in-ta kabel'n. prom-sti, 1957, Nr 2, pp 152-157

ABSTRACT: Bibliographic entry

Card 1/1

USCCMM-DC-60,665

SOV/110-59-9-12/22

Gurevich, A.S. and Vernik, S.M. (Candidates of Technical Sciences) AUTHORS:

Improvements in the Construction of Symmetrical High-Frequency Cables with paper-"string" Insulation TITLE:

PERIODICAL: Vestnik elektropromyshlennosti,1959,Nr 9,pp 43-45 (USSR)

ABSTRACT: In order to increase the number of channels transmitted by cables with paper-"string" insulation it is required to extend the frequency band-width from 108 to 252 kc/s. It is, therefore, necessary to reduce the interference between circuits within the desired frequency range. Mutual interference between circuits may result either from variations occurring in manufacture or from cable design factors. The construction of quad cables may be improved by reducing the winding pitch of the "string" or improved by reducing the winding pitch of the "string" or by winding the "string" and the plain paper with opposite lays in the pairs on the quad. The mechanical stability of cables has been improved by reducing the "string" pitch from 7 mm to 5 mm; further reduction only increased the capacitance. Graphs showing the influence of

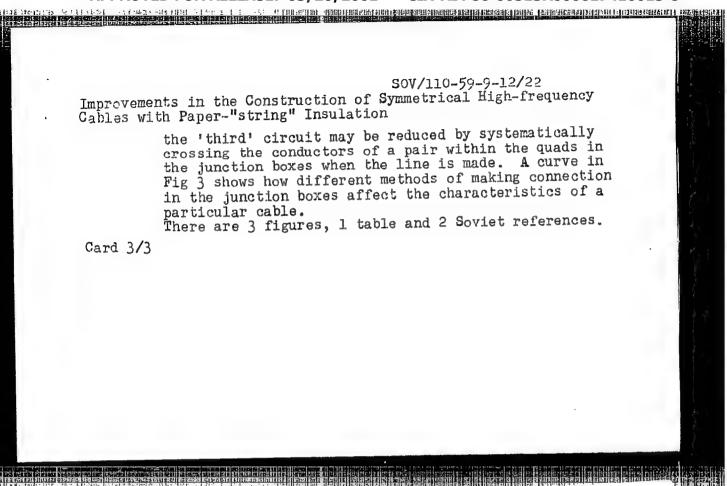
different types of cable construction on inter-circuit capacitance and asymmetry of capacitance are plotted in Card 1/3

SOV/110-59-9-12/22 Improvements in the Construction of Symmetrical High-frequency

Cables with Paper-"string" Insulation Fig 1. It will be seen that considerable improvement can be achieved by use of the two methods mentioned. The length of pitch of twisting of quads determines the amount of interference between circuits of the quad due to the lead sheath. The charges and currents induced in the sheath can have a considerable effect, approximating to that of imaginary conductors of perticular size and position outside the cable. Calculation of the influence of this 'third' circuit is discussed. Its influence can be reduced by reducing the pitch of twisting of the quad. However, this is only possible within limits, and a number of cables were made up of the same construction but different pitches of twisting in order to find the best values. Tabulated results show that the least pitch of twisting for cables with "string" insulation should be twisting for cables with "string" insulation the pitch about 150 mm. Tests established that altering the pitch of twisting of the conditional transfer of the conditional tr of twisting of the quad considerably improved the cable characteristics and Fig 2 shows a graph of inter-circuit capacitance and capacitance asymmetry as function of quad It was also found that the influence of

Card 2/3

twisting pitch.



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16(1) AUTHOR: TITLE: PERIODICAL: ABSTRACT:	Gurevich, A.S. On Degenerated Problems of the Calculus of Variations Vestnik Leningradskogo universiteta, Seriya matematiki, Nekhaniki i astronomii, 1959, Nr 19(4), pp 64-77 (USSR) mekhaniki i astronomii, 1959, Nr 19(4), pp 64-77 (USSR) Let the function $F(x,y_1,y_2,\ldots,y_n,z_1,z_2,\ldots,z_n) \equiv F(x,y,z)$ have continuous partial derivatives of third order. Let F_u denote the partial derivative with respect to u and a prime denote the derivative with respect to x ; let furthermore $F_{y_1^1,\ldots,y_n^1}$ Generalized theorem of Hilbert: If $y = y(x)$ is an extremal of the functional $F_{y_1^1,\ldots,y_n^1}$ $F_{y_1^2,\ldots,y_n^1}$ $F_{y_1^2,\ldots,y_n^2}$ $F_{y_1^2,\ldots,y_n^2}$
/ 0	and if the matrix (i,k = 1,2,,n) (1.4) $\ \mathbf{F}_{\mathbf{y}_{1}^{1}\mathbf{y}_{k}^{1}}\ $
Card 1/2	

On Degenerated Problems of the Calculus of Variations SOV/43-59-19-7/14

has the rank M in a point $x = a \in (x_1, x_2)$, then there exists an integer V, $0 \le V \le n$ so that in a certain neighborhood of x=a

integer V, $0 \le V \le n - M$ so that in a certain neighborhood of x=a (M+V) functions $y_i(x)$ have continuous second derivatives.

The author considers certain specific properties of degenerated variation problems. He proposes a method for the determination of the system of equations and the boundary conditions which have to be satisfied by the extremal in the degenerated variation problem. An example is given. The author mentions G.M.Fikhtengol'ts and thanks S.V.Vallander for his interest in the present paper. There are 4 references, 2 of which are Soviet, and 2 American.

SUBMITTED: Narch 12, 1959

Card 2/2

GUREVICH, A.S.; FALOV, A.A., inzh., retsenzent

[Equipment for the production of abrasive tools] Oborudovanie dlia proizvodstva abrazivnykh instrumentov. Mcdovanie dlia proizvodstva abrazivnykh instrumentov. Mcdovanie Alad-vo Washinostroenie," 1964. 259 p. (MisA 17:8)

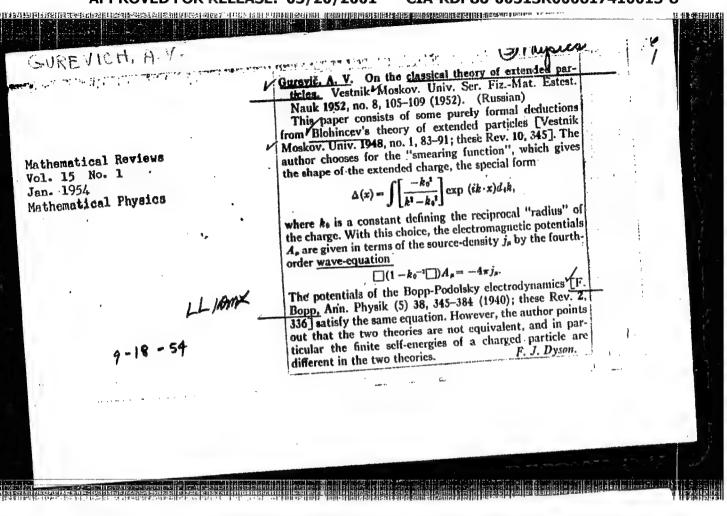
A THE PART OF THE PROPERTY OF GURBVICH, A.S., kand. tekhn. nauk; KURBATOV, N.D., kand. tekhn. nauk Mechanical reliability of communication cables. Elektroteknnika 35 no.11:30-32 N '64.

CIA-RDP86-00513R000617410013-8" APPROVED FOR RELEASE: 03/20/2001

GUREVICH, A.S., kand. tekhn. nauk; KURBATOV, N.D., dotsent

Small-sized coaxial cable with polyethylene balloon insulation. Vest. sviazi 25 no.10:3-4 S '65. (MIRA 18:11)

l. Nachal'nik otdela kabeley svyazi Leningradskogo filiala Nauchno-issledovatel'skogo instituta kabel'noy promyshlennosti (for Gurevich). 2. Leningradskiy elektrotekhnicheskiy institut svyazi (for Kurbatov).



是中国的企业,我们的企业,我们是一个企业,我们也是一个企业,但是一个企业,但是一个企业,但是一个企业,我们也不是一个企业,我们也可以会们,我们也可以是一个企业, FD-486 USSR/Nuclear Physics - Quantum electrodynamics GUREVICH, A. V. : Pub. 146-3/18 Card 1/1 Quantization of fields satisfying equations with higher derivatives. I. : Gurevich, A. V. Author Zhur. eksp. i teor. fiz., 24, 149-166, Feb 1952 Title : Devotes this work to problems in the quantum theory of wave fields that bevotes this work to problems in the quantum theory of wave fields that satisfy equations with higher derivatives. Carries out canonic quantization of fields satisfying the equations P_n (\square) = 4π 9, where P_n is an arbitrary polynomial of degree n. 9 references, including 6 Periodical Abstract foreign. Institution : Moscow State University : September 12, 1952 Submitted

GUREVICH, A.V.

USSR/Atomic and Molecular Physics - Low Temperature Physics, D-5

Abst Journal: Referat Zhur - Fizika, No 12, 1956, 34436

Author: Gurevich, A. V.

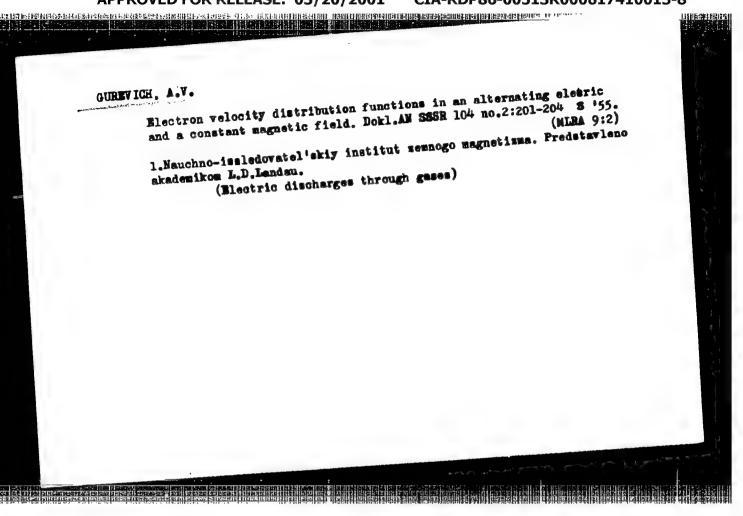
Institution: None

Title: On the Breakdown of Superconductivity of Films in a Magnetic Field

Original Periodical: Zh. eksper. i teoret. fiziki, 1954, 27, No 2, 195-207

Abstract: The question of breakdown of superconductivity of films by a magnetic field is investigated within the framework of the V. L. Ginzburg and L. D. Landau generalized theory of superconductivity (Zh. eksper. i teoret. fiziki, 1950, 20, 1064). Corrections of the order of χ^2 were obtained for the previously obtained expressions for the critical magnetic field H_k of superconducting films. The discovered between experiment and theory obtained in the work by Ncrepancy between experiment and theory, obtained in the work by N. V. Zavaritskiy (Dokl. AN SSSR, 1951, 78, 665; 1952, 82, 239) is eliminated.

1 of 1



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CIA-RDP86-00513R000617410013-8

GUREVICH, A.V.

USSR / Radiophysics. Radio-Waves Propagation

I -5

Abs Jour

Ref Zhur - Fizika, No 5, 1957, No 12530

Author

grevich, A.V.

Inst

: Not given

Ti tle

: Concerning the Problem of Propagation of Strong Electromagnetic Waves in a Plasma,

Orig Pub

: Radiotekhn. i elektronika, 1956, 1, No 6, 704-719

Abstract

: A theoretical investigation was made of the effect of "selfaction" upon propagation of strong electromagnetic waves in a plasma. The self-action is connected with the fact that, under the influence of a strong alternating field E, the frequency ω changes the velocity distribution of the electrons, and consequently there is a change also in the value of the

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USSR / Radiophysics. Radio-Waves Reception Propagation

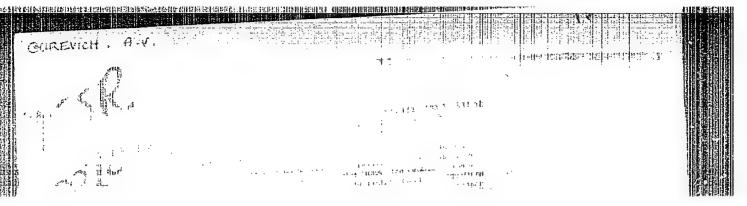
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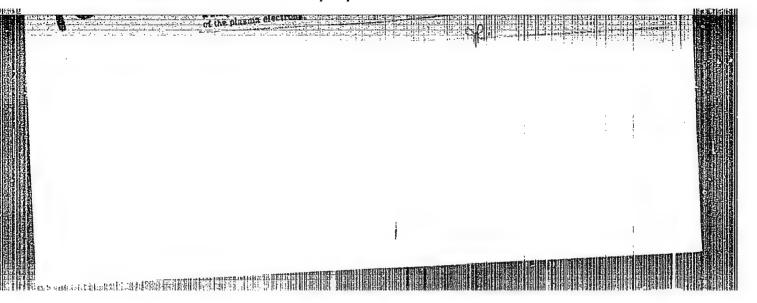
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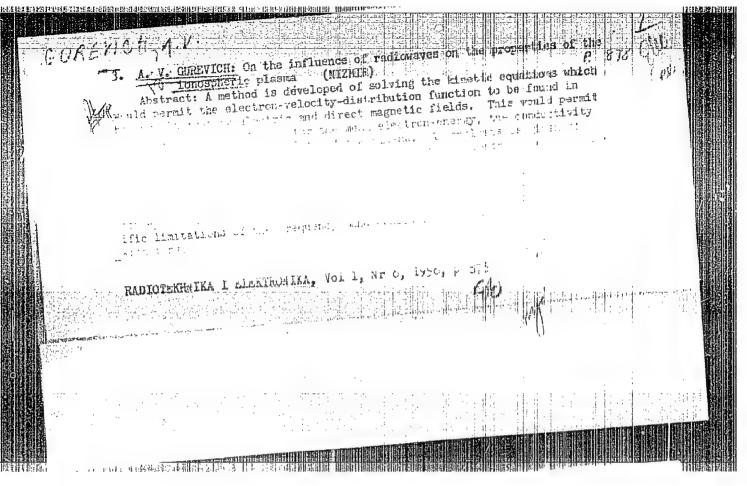
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1-6

BUREVICH, AN

SSR / Radio Physics, Propagation of Radio Waves.

Abs Jour : Rof Zhur - Fizika, No 3, 1957, No 7314

: Sciontific Research Institute for Terrestrial Magnetism, USSR. Author

: Concerning the Effect of Radiowaves on the Properties of Plasma Inst Title

(Ionosphere).

Orig Pub : Zh. eksperim i teor. fiziki, 1956, 30, % 6, 1112-11124

Abstract : The author investigates the problem of the dielectric constant and conductivity of magnetoactive plasma of the ionosphere type, subjected to a strong alternating electric field of frequency. A method is given for calculating the distribution function of the electrons by velocities (with allowance of enly the elastic collisions of electrons with the molecules and ions); the mothod consists of expanding the solutions of the kinetic equation in powers of a small parameter S-/w (for rapidly varying fields), where o is the fraction of the energy lost by the electron upon collision, and p is the effective number of collisions.

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APPROVED FOR RELEASE: 03/20/2001 CIA-RDP86-00513R000617410013-8

USSR / Radio Physics. Propagation of Radio Waves.

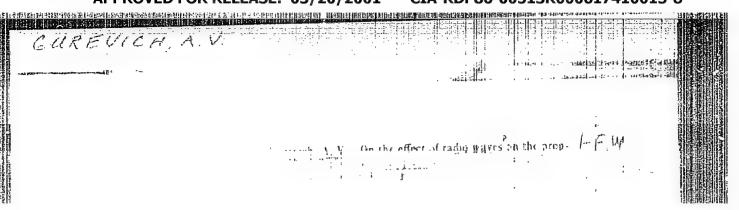
Abs Jour : Rof Zhur - Fizika No 3, 1957, No 7314

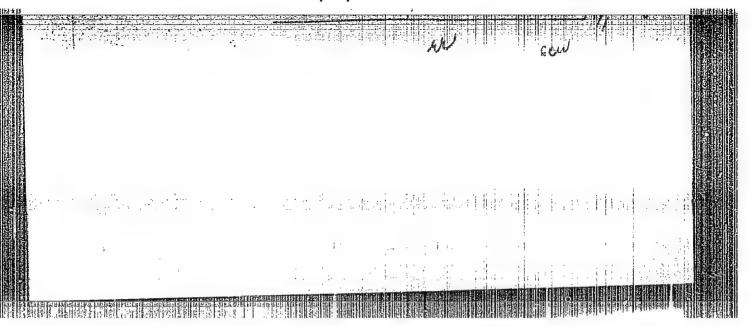
Abstract : The zero approximation obtained for the distribution function

coincides with the results obtained by other investigators (Ref Zhur - Fizika, 1950, 13134). A knowledge of this function makes it possible to calculate the mean energy of the electrons, the components of the dielectric constant tensors, and the conductivity of the plusma. General equations are derived for these quantities, and many special cases are unalyzed. In a mittion, the author considers the possibility of using the formulas from the elementary theory (in strong and weak electric fields) for the calculations. It is shown that in the case of collisions with molocules, the use of these equations loads to a small discrepancy with the results of the kinetic theory. For the case of collisions between electrons and ions, this discrepancy, as a rule, is more substantial. Bibliography, 14 titles.

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GUREVICH, A.V. 56-5-39/55 A Simplification of the Equations for the Function of the Distri-(Uproshcheniye uravneniy dlya funktsii raspredeleniya elektronov AUTHOR bution of Electrons in a Plasma. Zhurnal Eksperim.i Teoret.Fiziki,1957,Vol 32,Nr 5,pp 1237 1238(USSR) TITLE Starting out from the Boltzmann's kinetic equation, B.I. Davydov, Zhurn. eksp.i teor.fis., Vol 7, p. 1069 (1937), demived an approximate system PERIODICAL of equations for the function of electrons in a $f(\vec{r},\vec{v},t) = f_0(\vec{r},v,t) + \sqrt[4]{f_1(\vec{r},v,t)} + \sqrt[4]{f_1(\vec{r},v,t)}$ ABSTRACT plasma situated in an electrical and in a magnetic field. This system of equations is contained in the payer under review, and the quantities occurring in this system are explained. In this context, the paper under review shows that it is possible to simplify this system of equations For this purpose, the author of the present paper first of all investigates the case of a plasma that is homogenous with respect to time. In this case the symmetrical part of the distribution function of the electrons (fo) can change substantially only during a time span of the order of magnitude of 1/80, because 2 fo/2t & 80 fo. In this context, V = V (v) denotes the frequency of the collisions of an electron with the molecules or ions. At the same time, the (directed) current part in of the distribution function undergoes a considerable change during a time of the order of magnitude 1/3, because of the order of changes much faster cause of the Canada the Canada changes acon-Card 1/2

A Simplification of the Equations for the Function of 56-5-39/55 the Distribution of Electrons in a Plasma.

than f_0 as time progresses, Therefore it is possible at the integration of the above-mentioned system of equations to neglect the dependence of the function fo upon t. The thus obtained solution is correct with an accuracy of, at most, including the terms of the order of magnitude 5, i.e. with the same accuracy as the system of equations mentioned in the beginning of this paper. Then the paper under review proceeds to deal with the problem of determining the distribution function of the electrons of the one of the two equations of the system of equations mentioned above. The formulae for the special case of a plasma homogeneous with respect to time, and for the special case of a plasma inhomogeneous with respect to time are given. In a Maxwell's velocity distribution of the electrons, the equations for the distribution function are reduced to the system of equations for the temperature T_{θ} and the density n of the elec-Physical Institute "P.N.Lebedev", Academy of Sciences of the U.S.S.R.

ASSOCIATION PRESENTED BY SUBMITTED

AVAILABLE Card 2/2

13.12.1956 and 13.3.1957 Library of Congress.

06459 sov/141-1-5-6-3/28

AUTHOR:

On the Theory of the Cross-modulation of Radiowaves

Izvestiya vysshikh uchebnykh zavedeniy, Radiofizika, TITLE:

1958, Vol 1, Nr 5-6, pp 17 - 28 (USSR)

ABSTRACT; First, the depth of cross-modulation μ ' in the presence of a strong perturbing wave is considered. It is assumed that at the boundary of the plasma, the perturbing wave is $(1) \cdot$

expressed by:

 $E_1 = E_0(1 + \mu_0 \cos \Omega t) \cos \omega_1^t$

When the wave propagates in the plasma, the effective temperature of the electrons varies periodically and the absorption of the second wave, B2, is changed. This

results in the modulation of

The depth of cross-modulation of E2 over a distance dz The final expression for the depth of the 3085-modulation μ^{\dagger} is, therefore, given by

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SOV/141-1-5-6-3/28 On the Theory of the Cross-modulation of Radiowaves is expressed by the second equation on Eq (3), where 1/1 p 20, while T is defined by Eq (3'). The remaining

symbols are as follows: N is the electron density, is the electron is the refractory index for E1, o collision frequency in the unperturbed plasma, plasma temperature and k is the Boltzman constant. Eq (3) can be used to determine μ' as a function of the amplitude of the perturbing wave (at the boundary of the plasma). The results are shown in Figure 1, where the relative cross-modulation depth f is plotted as a function of the amplitude of the perturbing field. When the perturbing field is comparatively small, Eq (3) can be written as Eq (4). The results obtained from Eq (4) are also plotted in Figures 1 ("dashed" curves). The dependence of $\mu^{\mathfrak{g}}$ on the power P of the perturbing station is illustrated in Figure 2. In order to investigate the increase of the cross-modulation at the gyro-frequency, it is sufficient to take into account the interaction of

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06459 SOV/141-1-5-6-3/28 f Radiowaves

On the Theory of the Cross-modulation of Radiowaves

the extraordinary perturbing wave; the ordinary wave

produces a negligible cross-modulation and does not

produces any resonant effects. If the perturbing wave

is comparatively weak and the frequency of E2 is

higher than $\sqrt{100}$, the cross-modulation can be determined from (Ya. L. Al'pert et al - Ref 7):

from (Ya. L. Al'pert et al = Ref //
$$\mu' = \frac{\omega_2}{c} \sum_{\nu_0} \frac{\Delta \nu}{\nu_0} ds = \frac{\omega_2}{c} \sum_{\nu_0} \frac{e^2 \mathbf{E}^2(\mathbf{s})}{3mkTb(\omega_1^2 + \nu_0^2)} ds \qquad (6) ,$$

where $\triangle V$ is the amplitude of the periodic perturbation of the collision frequencies, V_2 is the absorption coefficient for E_2 , $w_1^{\dagger} = w_1 - w_1$, E(s) is the amplitude of the perturbing wave at a point s, where w_H is the gyro-frequency. Since the total absorption of E_2 in the ionosphere is given by Eq (7), the cross-

Card3/5

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SOV/141-1-5-6-3/28 On the Theory of the Cross-modulation of Radiowaves The prameter K modulation can be expressed as Eq (8). in Eq (8) denotes the absorption of the perturbing wave up to the reflection point of the wave \mathbf{E}_2 , while the expression for $f(K_1^0)$ is given by Eq. (8:). The function $f(K_1^0)$ is plotted in Figure 3 for various values of n. From Eq (8) it follows that μ^* depends but little on the frequency of the perturbing wave, provided that the wave is strongly absorbed in the interaction region. The dependence of μ° on ω_{1} , in the vicinity of ω_{H} , is illustrated in Figure 5a; the curves are evaluated for

given by the penultimate equation on p 27. Similarly, the case of the phase for $\Omega \gg \delta v_0$ is expressed by

the last equation on p 27. These formulae were used to

the case when the frequency of \mathbf{E}_2 is comparatively low. The phase of the cross-modulation for $\Omega \ll \delta V_0$ is

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On the Theory of the Cross-modulation of Radiowaves

是一个人,我们就是一个人的人,我们就是一个人的人,我们们的人们的人们的人们的人,我们就是一个人的人的人的人的人,我们也可以完全的人的人的人,我们们就会看到一个人

determine the relative phase and the results are plotted in Figure 6. The author makes acknowledgment to V.L. Ginzburg for his interest in this work. There are 6 figures and 22 references, of which 15 are English and 7 Soviet.

ASSOCIATION: Fizicheskiy institut imeni P.N. Lebedeva AN SSSR (Physics Institute im. P.N. Lebedev of the Ac.Sc.USSR)

SUBMITTED: June 20, 1957 to Radiotekhnika i elektronika, then to the editor of this journal on May 5, 1958

Card 5/5

061:86 sov/141-58-4-2/26

AUTHOR:

Gurevich, A.V.

TITLE:

On the Change of Modulation of Strong Radio Waves in a Plasma (Ionosphere) (Ob izmenenii modulyatsii sil'nykh

radiovoln v plazme (ionosfere))

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Radiofizika,

1958, Nr 4, pp 21-31 (USSR)

ABSTRACT:

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The first part of this work was published earlier (Ref 1). The propagation of strong radio waves in a plasma is considered in an approximation which corresponds to the geometrical optics approximation in the usual theory. It is shown that the frequency spectrum of the modulated incident wave is distorted. These distortions are small, provided w>> 57, where & is the mean fraction of energy lost by electrons per collision and ? is the frequency of collisions. In this case the amplitude of the harmonics is small compared with the amplitude of the fundamental wave. In the E-layer of the ionosphere the condition w>> 6 v is well obeyed for radio waves whose frequency is greater than 1 kc/s, while in the D-layer the frequencies must be greater than 50 kc/s. For the F-layer this lower frequency limit is 1 c/s while in the

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On the Change of Modulation of Strong Radio Waves in a Plasma (Ionosphere)

solar corona it is 0.1 c/s. The absorption of a strong wave in the plasma may be quite different from absorption of a weak wave. For very strong radio waves whose amplitude is much greater than the "plasma field" (E_0) En) the usual concept of absorption loses its meaning altogether. For such waves two effects can take place. They either freely pass through the plasma without experiencing any absorption (independently of the degree of absorption experienced by a weak wave of the same frequency) or they are fully absorbed in the plasma (in the latter case the wave always becomes weak after passage through a plasma layer and amplitude of the resultant weak wave is determined only by the plasma field and does not depend on the amplitude of the incident wave). The first case occurs for high-frequency waves when ω >> \vee in a strongly ionised plasma and for low-frequency waves when $\omega \ll V$ in a weakly ionised plasma. The second effect occurs for w>>> in a weakly ionised plasma. Non-linear properties of the ionosphere are most pronounced in the

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On the Change of Modulation of Strong Radio Waves in a Plasma (Ionosphere)

lower part of the E-layer for waves whose frequency is f < 500 kc/s. However, for waves with ₩≈500-1000 kW the above limiting cases are not in fact realised since the E_0 of the incident wave is of the same order as $E_{\rm R}$. In order to take into account changes in the absorption of such waves a special coefficient P was introduced earlier (Ref 1), to describe changes in the amplitude. Table 1 gives the values of this coefficient for different frequencies and powers. Analysis of these data shows that, for example, when a transmitter working on 500 kc/s alters its power from 1000 to 5000 kW the amplitude of the wave reflected from the ionosphere increases by a factor of 1.44, while in the case of a weak wave such an increase in the amplitude could be obtained by increasing the power by a factor of only 2 and not 5. The phase of the wave is not affected very much. Phase changes are most pronounced for waves whose frequency is nearly equal to the effective electron collision frequency. It is shown that the modulation amplitude of the wave can change very considerably.

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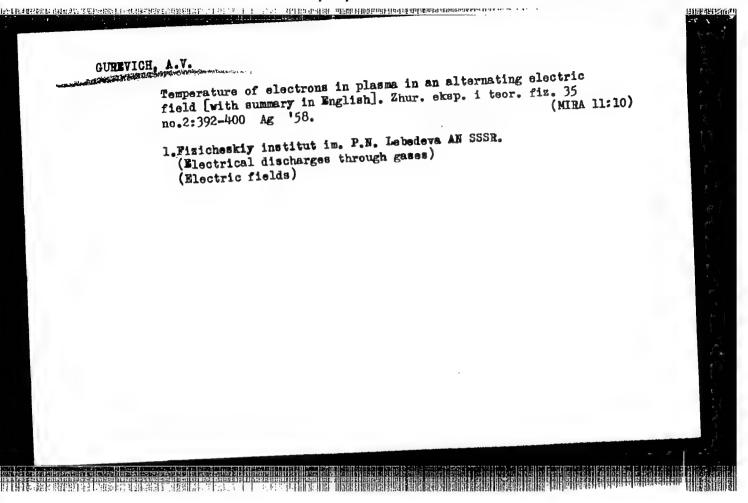
On the Change of Modulation of Strong Radio Waves in a Plasma (Ionosphere)

If $E_0\gg E_n$ the wave is either completely demodulated on passing through a plasma layer or the depth of its modulation is increased. The first case occurs in a weakly ionised plasma for high-frequency waves and the second for low-frequency waves. The changes in the modulation depth occur only at low modulation frequencies ($\leq \delta \gg$); at higher frequencies they are negligible. An estimate is also made of the phase modulation of strong waves in a plasma. There are 8 figures, 1 table and 13 references, 6 of which are Soviet, 4 Italian and 3 English.

ASSOCIATION: Fizicheskiy institut im P.N.Lebedeva, AN SSSR (Physical Institute imeni P.N.Lebedev, AS USSR)

SUBMITTED: 5th May 1958

Card 4/4



67526

9,9100

sov/141-2-3-3/26

AUTHOR: TITLE:

Gurevich, A.V.

The Effect of an Electric Field on the Electron Velocity

Distribution in Molecular Plasma (Ionosphere)

Izvestiya vysshikh uchebnykh zavedeniy, Radiofizika, 1959, Vol 2, Nr 3, pp 355 - 369 (USSR) PERIODICAL:

ABSTRACT: In molecular gases such as hydrogen, oxygen and nitrogen, inelastic collisions predominate already at energies of 0.01 eV (i.e. at room temperature). Moreover, there is not enough information at the present time on inelastic cross-sections for collisions between slow electrons and molecules (Ref 2) and hence the problem of the electronvelocity distribution in molecular plasma has not been solved. The mean electron energy and the current in molecular plasma are usually calculated with the aid of a simplified kinetic theory in which the velocity distribution of the plasma electrons is not taken into account. It follows that the results obtained are only approximate and the problem arises of how approximate these results actually are. The problem can only be solved by rigorous application of the kinetic theory. This is done in the

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SOV/141-2-3-3/26
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The Effect of an Electric Field on the Electron Velocity Distribution in Molecular Plasma (Ionosphere)

present paper. In the first section, it is shown that using the properties of a molecular plasma the kinetic equation (analogous to that normally used for purely elastic collisions) can be considerably simplified. collision integral (for inelastic collisions in molecular plasma) is found to be of the form given by Eq (8b), where $Q_{rr}(v)$ is the fraction of energy lost per unit time by an electron due to inelastic collisions. This relation holds for energies & 1 eV. In the next two sections a solution is obtained of the kinetic equation and the solution is analysed in the case of hydrogen, oxygen and nitrogen. It is shown that the effective frequency of collisions and the electron current in the case of a high degree of ionisation are given by Eq (11a) and the average fraction of energy lost by an electron per collision is given by Eq (11b). Figure 1 shows a plot of the calculated values of the latter quantity as a function of temperature. Experimental points are also indicated. The agreement between

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The Effect of an Electric Field on the Electron Velocity Distribution in Molecular Plasma (Ionosphere)

theory and experiment is shown to be good. A similar calculation is carried out for the case of a low degree of ionization and the average energy loss is calculated for hydrogen, oxygen, nitrogen and air. The result is shown in Figure 2. The final section is concerned with the accuracy of the formulae obtained with the aid of the simplified kinetic theory and the limits of their applicability. It is shown that in the case of hydrogen, oxygen, nitrogen and air the simplified kinetic theory may be used for low electron energies without an appreciable error in order to calculate the mean electron energy and current. Kinetic corrections become important at low frequencies, i.e. frequencies smaller than the effective collision frequency. Acknowledgment is made to V.L. Ginzburg for his interest in this work. There are 5 figures and 18 references, 9 of which are Soviet (1 is a translation from English), 1 German, 2 international and 6 English.

Card 3/4

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SOV/141-2-3-3/26

The Effect of an Electric Field on the Electron Velocity Distribution in Molecular Plasma (Ionosphere)

ASSOCIATION: Fizicheskiy institut im. Lebedeva (Physics Institute

im. Lebedsv)

SUBMITTED: December 25, 1958

Card 4/4

21(7), 9(3)

Gurevich, A. V.

507/56-36-2-47/63

TITLE:

The Unsteadiness and the Hysteresis of the Electron Temperature in a Plasma in Inert Gases (Nestatsionarnost' i gisterezis elektronnoy temperatury v plazme v inertnykh gazakh)

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PERIODICAL:

Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 36, Nr 2, pp 624-626 (USSR)

ABSTRACT:

In one of his previous papers (Ref !), the author discussed some special features of the heating of an electron gas in a heavily ionized plasma. These features are caused by the fact that the frequency of the collisions of the electrons with the ions sharply decreases if the electron velocity increases. Analogous effects occur also in a weakly ionized plasma; it is only necessary that the collision frequency of the electron sufficiently sharply decreases with the increase of electron

velocity: $v \sim v^{-\alpha}$ where $\alpha > 1$. This condition is not satisfied in the general case since the frequency of the electron-molecule collisions usually increases with increasing v. Also the inverse dependence is, however, possible. This occurs, for exam-

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SOV/56-36-2-47/63

The Unsteadiness and the Hysteresis of the Electron Temperature in a Plasma in Inert Gases

ple, in the heavy inert gases argon, crypton, xenon at low electron velocities $v \lesssim 5$. 10^7 cm/sec (Ramsauer (Ramzauer) effect). For a weakly ionized plasma, the steady electron temperature T is calculated in the same manner as for a highly ionized plasma and the found dependence of T_{Θ} on the field strength of the electric field in crypton (at 27°C) is given in a figure. According to this figure, the weakly heated state of the electron gas becomes insteady at a certain value of the field strength (as in the case of a highly ionized plasma). In the case investigated in the present paper, however, there is also a second stable state at high electron temperatures; it is caused by the increase of the frequency of the collisions of the electron with the crypton atoms at high velocities (v > 5 . 10^7 cm/sec). The critical values of the field strength for transitions from the first into the second state and inversely are only slightly different. The hysteresis loop, therefore, includes only a small area. The electron temperature varies 3 times in these

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sov/56-36-2-47/63

The Unsteadiness and the Hysteresis of the Electron Temperature in a Plasma in Inert Gases

transitions, and therefore also electron conductivity varies. The calculations discussed in this paper are valid only in the case in which the electrons have a Marwell (Maksvell) velocity distribution. There are 1 figure and 4 references, 2 of which

are Soviet.

Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR (Physics Institute imeni P. N. Lebedev of the Academy of ASSOCIATION:

Sciences, USSR)

October 23, 1958 SUBMITTED:

Card 3/3

sov/56-37-1-50/64 24 (5) Gurevich, A. Vanne AUTHOR: The Influence of Collisions Between Electrons on Their Velocity Distribution in Gases and in Semiconductors in the Electric Field (Vliyaniye soudareniy mezhdu elektronami na ikh rasprede-TITLE: leniye po skorostyam v gazakh i v poluprovodnikakh v elektricheskom pole) Zhurnal eksperimental noy i teoretioheskoy fimiki, 1959, Vol 370 PERIODICAL: Nr 1, pp 304 - 306 (USSR) In a plasma, which is located in an electric field, the velocity distribution function of electrons depends only on the velocity modulus and is symmetric. In the case of a very low ionization ABSTRACT: of the plasma, its shape is influenced only by the collisions between electrons and heavy particles, but with higher ionization, collisions among electrons play an important part; this leads to an approximation of the distribution function to the Maxwell form. The author of the present "Letter to the Editor" briefly investigates the influence of collisions of electrons among themselves upon the form of the distribution function. By using the results obtained by Landau (Ref 4) and by taking the symmetry of the main part of the distribution function into Card 1/4

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The Influence of Collisions Between Electrons on Their SOV/56-37-1-50/64 Velocity Distribution in Gases and in Semiconductors in the Electric Field

account, the integral of the collisions See of the electrons is set up in the following manner:

 $S_{ee}(f_o, f_o) = -\frac{1}{\sqrt{2}} \frac{\partial}{\partial v} \left\{ v^2 \right\}_{ee} \left[A_1(f_o) \frac{\partial f_o}{\partial v} + A_2(f_o) v f_o \right] \right\}$

We denotes the collision frequency of the electrons (explicitly written down in formula (1!)), and also the coefficients A_1 and A_2 are explicitly given. In the following, a parameter p, which characterizes the influence of collisions among electrons upon the distribution function, is defined: $p = \frac{12\pi e^2 Ng}{1e^2} \ln \left(\frac{k^{3/2} T_0 T^{1/2}}{e^3 N^{1/2}}\right)$;

e is the electron charge, Ne and Te denote the density and temperature of the electrons, T - the temperature of the heavy particles. For strong constant electric fields E, the distribution

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The Influence of Collisions Between Electrons on Their SOV/56-37-1-50/64 Velocity Distribution in Gases and in Semiconductors in the Electric Field

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may in first approximation $(f_0^{(1)})$ be given by formula (3). For high u-values $(u = mv^2/2kT_e)$ $f_0^{(1)}$ actually coincides with $f_0^{(2)}$, and for not too high p-values the distribution may approximately be represented by

 $f_{o} = C \exp \left\{ -\frac{u^{2}}{4} + \frac{pu}{4} - \frac{p(p+4)}{8} \ln(1 + \frac{2u}{p}) \right\}$ In a diagram the figure shows the dependence of $\ln(f_{o}^{(1)}/c)$ on u

for various p-values. For high p-values the curve approaches Maxwell's straight line, and for p = 0.1 it practically coincides with Druyvestein's parabola (Ref 8). The author finally thanks V. L. Ginzburg, L. V. Keldysh and L. M. Kovrizhnykh for discussions, and L. V. Pariyskaya for carrying out numerical computations. There are 1 figure and 8 references, 4 of which are Soviet.

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The Influence of Collisions Between Electrons on Their SOV/56-37-1-50/64 Velocity Distribution in Gases and in Semiconductors in the Electric Field

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR

(Physics Institute imeni P. N. Lebedev of the Academy of

Sciences, USSR)

SUBMITTED: March 4, 1959

Card 4/4

"APPROVED FOR RELEASE: 03/20/2001

CIA-RDP86-00513R000617410013-8

s/194/61/000/008/082/092

3,2600 (1538,1502)

AUTHOR:

Gurevich, A.V.

TITLE:

Perturbances in the ionosphere caused by a moving

body

PERIODICAL:

Referativnyy zhurnal. Avtomatika i radioelektronika, no. 8, 1961, 68, abstract 8 1469 (Tr. In-ta zemn. magn. ionosfery i rasprostr. radiovoln. AN SSSR, 1960, no. 17 (27), 173-186)

In the survey of the ionosphere, the rockets and satellites themselves produce perturbances by changing in the vicinity of their surface of gas density, ion or electron concentration, the electric field and temperature. It may be possible that the above perturbances account for the experimentally observed strong dispersion of radiowaves transmitted from earth in the vicinity of a satellite. The motion of bodies in upper ionosphere layers is characterized by two peculiar effects. The motion is inside a

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S/194/61/000/008/082/092 D201/D304

Perturbances in the ionosphere...

strongly rarified gas, with lengths of particle trajectories much exceeding the dimensions of the body. Thus a correction must be introduced into the kinetic theory accounting for the new gas structure which has to be taken as an aggregate of independent molecules. On the other hand, since the motion is inside an ionized gas-plasma, it is necessary to take into account the interaction between the body and electrons and ions. This leads to a difference in the ion and electron perturbances, the upsetting of the quasi-linearity of plasma and appearance of an electric field. The changes in the concentration of neutral particles in the vicinity of the moving body have been evaluated by the methods of the generalized kinetic theory of gases, using the kinetic equation in a differential form. The problem has also been solved of concentrating electrons and ions, and the magnitude of the electric field has been determined. In conclusion the problem is analyzed of the possibility of excitation of longitudinal waves in plasma by the stream of ions reflected from the body. In the solution of the above problems the assumption is made that the following relationship is satisfied

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$$\sqrt{\frac{kT}{M}} << v_0 << \sqrt{\frac{kT}{m}}$$
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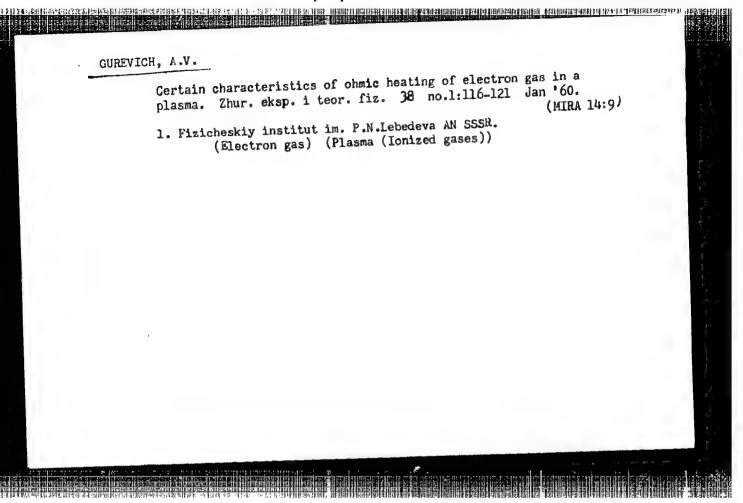
where k - Boltzmann's constant, T - absolute temperature in ${}^{\circ}K$; M - molecule mass; m - electron mass; v_o - the velocity of body in the ionosphere ~ 10 km/sec. Gases when $v_{\circ} < \sqrt{\frac{kT}{N}}$ (order of 1 km/

sec), are not considered. In front of bodies a region of concentration of molecules is obtained. The relative increase in density is 1.02-2. In the wake of the body there is a corresponding region with decreased relative density equal to 0 in the vicinity of the body, and increasing to 0.9 at a distance equal to 24.5 body radii.

Abstracter's note: Complete translation

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Card 3/3



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s/056/60/038/005/036/050 B006/B063

AUTHOR:

Gurevich, A.

TITLE:

The Problem of the Amount of Accelerated Particles in an Ionized Gas Under Various Accelerating Mechanisms

PERIODICAL:

Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960, Vol. 38, No. 5, pp. 1597-1607

TEXT: As a contribution to investigations on the origin of cosmic rays and solar corpuscular radiation, the present paper describes an analysis of accelerating mechanisms in ionized gas. The author first considers Fermi's statistical accelerating mechanism, in which the ion energy grows on account of collisions with clouds of charged particles. If the mean free path L of the ion between two collisions is constant and independent of the ion energy ϵ , the ion receives the energy $2/3Mv_{cl}^2$ in each collision (M - ion mass, v_{cl} - mean velocity of the cloud). A comparison between the energy obtained and the energy transferred by interaction with other ions gives the relation $\xi < \xi_{in} = 3v_o L(kT)^{3/2}/2 \sqrt{2} v_{cl}^2 M^{1/2}$ for the condition that the ion energy tends toward a steady value. If $\varepsilon > \varepsilon_{in}$, it grows Card 1/3

83603

The Problem of the Amount of Accelerated Particles S/056/60/038/005/036/050 in an Ionized Gas Under Various Accelerating B006/B063

Mechanisms

continuously in time. \mathcal{E}_{in} is usually designated as injection energy. If $\mathcal{E}_{in} \sim kT$, all particles are accelerated simultaneously. If $\mathcal{E}_{in} \gg kT$, only in $\sim kT$, all particles are accelerated at first, whose energy is sufficiently high the (small) part is accelerated at first, whose energy is sufficiently high the (small) part is the so-called weak mechanism which is studied in $(\mathcal{E} > \mathcal{E}_{in} \gg kT)$. This is the so-called weak mechanism which is studied in this work. If $\mathcal{E} > \mathcal{E}_{in}$, the particle energy grows in time, and during Δt about $\Delta N \sim \nu \Delta t N(\mathcal{E}_{in})$ particles leave the equilibrium region. $N(\mathcal{E}_{in})$ denotes the number of particles having an energy between $\mathcal{E}_{in} - kT$ and \mathcal{E}_{in} . In the case of Maxwellian distribution, $\Delta N \sim \nu \Delta t N \exp(-\mathcal{E}_{in}/kT)$. ($\nu(\mathcal{E})$ denotes the collision frequency; $\nu(\mathcal{E}) = \nu_{in} (kT/\mathcal{E})^{3/2}$). It is found that the character of the velocity distribution in the range $\mathcal{E} \sim \mathcal{E}_{in}$ is changed by the weak acceleration mechanism to such an extent that these relations are unsuited for estimating the number of particles leaving the region. (These particles are called "accelerated particles"). The amount of accelerated particles is one of the principal characteristics of the weak mechanism. The determination of the flux of these accelerated particles as a function of the parameters Card 2/3

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The Problem of the Amount of Accelerated Particles in an Ionized Gas Under Various Accelerating Mechanisms

S/056/60/038/005/036/050 B006/B063

involved was the principal aim of the author's investigations. First, he gives some relations for a system of similar particles being in Coulomb interaction and which are influenced by the weak statistical accelerating mechanism. These relations include the equation of motion whose steady-state solution is treated in the following section of the present paper. Furthermore, the author considers the stabilized quasisteady solution, and derives a general solution for the flux of the accelerated particles. The distribution function is also given in a general form. Finally, the author specializes the flux formula for ion acceleration in a plasma by Fermi's statistical accelerating mechanism and obtains formula (24). If v2 is independent of the parameters of the plasma, the flux drops exponentially with increasing plasma density and increases with the temperature of the plasma. The flux of the accelerated ions increases also rapidly with an increase in the ion mass. The author thanks V. L. Ginzburg for his interest in this work, and S. I. Syrovatskiy for his valuable advice. There are 1 table and 2 non-Soviet references.

ASSOCIATION:

Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR

(Institute of Physics imeni P. N. Lebedev of the Academy of Sciences USSR)

SUBMITTED: Card 3/3

December 21, 1959

26.2311 (1144, 1164)

S/056/60/039/005/019/051 B006/B077

AUTHOR:

Gurevich, A. V.

TITLE:

Theory of the Effect of the Runaway Electrons

PERIODICAL:

Zhurnal eksperimental noy i teoreticheskoy fiziki, 1960,

Vol. 39, No. 5(11), pp. 1296-1307

TEXT: In a plasma the collision frequency of an electron with an ion and other electrons decreases rapidly with increasing velocity, and, therefore, the friction of the electrons with a sufficiently high energy is negligibly small. If the plasma is in a constant electrical field, the velocity of these electrons called "runaway electrons" will increase continuously with time. Very strong fields will accelerate all electrons and they all enter the category of the "runaway electrons", but in a weak field this will hold only for such with v > v crit. In weak fields

 $v_{crit} \gg v_{therm}$ of the electrons in the plasma. In order to determine v_{crit} it is necessary to know the distribution of velocity of the electrons at $v \sim v_{crit}$, this calculation being a very complicated problem if the

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त्रकारात । महारा सिक्षा के कि स्थान क्षा के कि सम्बद्धा के स्थित के स्थान के स्थान के स्थान के स्थान के स्थान इस्ता सिक्षा सिक्षा सिक्षा के सिक्षा के

Theory of the Effect of the Runaway Electrons

S/056/60/039/005/019/051 B006/B077

collisions are taken into account. The aim of the present paper was to examine the effect of a relatively weak field upon the distribution of velocity of the electrons in a plasma at high velocities. The authors derive and analyze expressions for the steady distribution function and the flow of the "runaway electrons" in a completely ionized plasma. The plasma is assumed to be unbounded and completely ionized, the electron velocity to be value.

For the case of a weakly ionized plasma the effect of the neutral particles upon the flow of the "runaway electrons" is examined and an analysis of the degree of ionization performed. The instabilities arising in a spatially homogeneous plasma are also studied. It is shown that under certain conditions plasma instabilities may occur during the development of the discharge due to the runaway electron flux. The results obtained agree in quality with experimental results. The author thanks V.L.Ginzburg and V. P. Silin for discussions. L. M. Kovrizhnykh is mentioned. There are 11 references: 8 Soviet and 3 US.

Card 2/3.

Theory of the Effect of the Runaway Electrons

s/056/60/039/005/019/051 B006/B077

ASSOCIATION:

Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR

(Institute of Physics imeni P. N. Lebedev of the Academy

of Sciences USSR)

SUBMITTED: .

May 23, 1960

Card 3/3 ;

68696 24.2120 s/053/60/070/02/004/016 AUTHORS: B006/B007 Which Is Located in a Variable Nonlinear Phenomena in a Plasma TITLE: Electromagnetic Field Uspekhi fizicheskikh nauk, 1960, Vol 70, Nr 2, pp 201-246 (USSR) PERIODICAL: The present paper is the first part of a very detailed survey of the theory of nonlinear phenomena in an ionized gas. This ABSTRACT: article will be published simultaneously in the periodical "Fortschritte der Physik" of Eastern Germany. The nonlinearities occurring partly because of the relatively great electron free path and partly because of the considerable difference between electron mass and atomic- and molecular masses already at comparatively low field strengths (e.g. if the polarization and the conduction current are not proportional to the field E, the propagation of electromagnetic waves must be described by a nonlinear theory, as the superposition principle, for example, no longer holds), are systematically dealt with with reference to voluminous publications. In the first two paragraphs of the present article, the influence exerted by a homogeneous electric

field

Card 1/4

Nonlinear Phenomena in a Plasma Which Is Located S/053/60/070/02/004/016 in a Variable Electromagnetic Field B006/B007

 $\vec{E} = \vec{E}_0 e^{ijt}$ upon a non-relativistic and non-degenerate (classical) plasma which may be located in a homogeneous and constant (external)magnetic field \vec{H}_0 is investigated. Macroscopic (hydrodynamic) motions in the plasma are not dealt with. The influence of the field upon the plasma in this case leads to a change in the velocity-distribution function of the plasma electrons, which is set up as a function of ω , \overline{E}_{o} , \overline{H}_{o} and of the plasma parameters. The distribution function of the heavy particles may in this case be considered to be a Maxwell temperature function, which is justifiable in the steady case under investigation. If the electron velocity distribution is known, their kinetic energy (their temperature Te) and the total current density Jt may be determined. In weak fields electron temperature is equal to that of the heavy particles, and j_t is proportional to \tilde{E} . Paragraph 1 deals with the elementary theory of the plasma in a homogeneous electric (electron current; dielectric constant and plasma conductivity; electron temperature). In paragraph 2 the kinetic theory of a

Card 2/4

Nonlinear Phenomena in a Plasma Which Is Located S/053/60/070/02/004/016 B006/B007 in a Variable Electromagnetic Field

plasma in a homogeneous electric field, i.e. the description of the electron gas by means of distribution functions $f(\vec{v},\vec{r},t)$ is dealt with. Individual sections deal with the following: The kinetic equation; the transformation of the collision integral; elastic collisions with neutral particles (molecules); inelastic collisions with neutral particles; collisions with ions; collisions of electrons with one another; the solution of the equation of motion for a highly ionized plasma; the (Maxwellian) distribution function; the effective number of (Maxwellian) distribution runoulon; the effective portion of transferred energy of (table 1 gives the eff-values for electron temperatures of between 500 and 15000 for helium, hydrogen, oxygen, nitrogen, and air; deff equals delast up to electron temperatures of ~ 1 ev, after which it increases exponentially with $T_{\rm e^{\circ}}\rangle;$ electron current, dielectric constant and conductivity of the plasma; electron temperature; the weakly ionized plasma; elastic collisions; the molecular plasma; inert gases; the electron current and the mean energy of the electrons; the elementary theory

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Nonlinear Phenomena in a Plasma Which Is Located S/053/60/070/02/004/016 in a Variable Electromagnetic Field B006/B007

for an arbitrary degree of ionization; transition from the highly— to the weakly ionized plasma; and the conditions for the applicability of the elementary theory (by comparison with the kinetic theory these conditions are mathematically formulated for highly and weakly ionized plasma). There are 8 figures, 2 tables, and 68 references, 35 of which are Soviet.

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Gurevich, A. V. \$/053/60/070/03/001/007 AUTHORS: Nonlinear Phenomena in a Plasma Located in a Variable Electro-TITLE: magnetic Field Uspekhi fizicheskikh nauk, 1960, Vol 70, Nr 3, pp 393-428 (USSR) This article is continued from a survey published in PERIODICAL: "Uspekhi fizicheskikh nauk", 1960, Vol 70, p 202. Paragraph 3 deals with the nonlinear effects occurring in the propagation ABSTRACT: of radio waves in a plasma (Monosphere, eolar corona), per-turbation of the principle of superposition, influence of the wave field on the plasma, Maxwell equations. Section 3.1 deals with the propagation of radio waves in a plasma in consideration of nonlinearity (self-action of the radio waves). In this case, the field at the plasma boundary (z=0 plane) is assumed to be $\vec{E}_0(0)$ cos ω t, and the wave propagation is described by $\Delta \vec{E}$ - grad div \vec{E} + $\frac{\omega^2}{2}$ ϵ^i $(\vec{r}, \omega, E_0)\vec{E} = 0$; $\epsilon^i = \epsilon - \frac{4\pi\sigma i}{\omega}$. The amplitude and the self-action factor are studied, and the modulation of waves is discussed in detail. Section 3.2 Card 1/3

Nonlinear Phenomena in a Plasma Located in a Variable Electromagnetic Field

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describes the influence of self-action on the propagation of radio waves in the ionosphere. This self-action depends on the wavelength, and is separately studied for short waves, medium waves (Table 4), and long waves. The resonance of selfmodulation near the gyromagnetic frequency, which amounts to (6 - 8).106 in the ionosphere, is also investigated. The specific features and the causes of this greatly nonlinear effect are discussed separately. Section 3.3 is devoted to an investigation of the interaction between modulated radio waves (cross modulation). A theoretical study of cross modulation in an isotropic plasma is followed by an investigation of the influence of a constant magnetic field and of the resonance effects occurring near the gyromagnetic frequency. Section 3.4 describes the results of experiments on cross modulation in the ionosphere (absolute cross-modulation depth, dependence of the depth μ_{Ω} and the phase of cross modulation on the depth $\mu_{\mathbf{O}}$ and the frequency Ω , dependence of $\mu_{\mathbf{Q}}$ on the intensity and frequencies of the disturbing waves, and cross-modulation

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Nonlinear Phenomena in a Plasma Located in a S/053/60/070/03/001/007 Variable Electromagnetic Field 8006/B014

resonance). In section 3.5 the authors study the nonlinear interaction of nonmodulated radio waves. At first, the variations of propagation conditions for a nonmodulated wave are investigated, then so-called lateral waves, viz. waves with combined frequencies, and finally the nonlinear effects connected with the variation in electron concentration. This article is concluded with a few notes about future studies in this field. There are 11 figures, 2 tables, and 65 references, 21 of which are Soviet.

Card 3/3

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AUTHOR:

Gurevich, A.V.

TITLE:

Disturbances Produced in the Ionosphere by a Moving

Body

PERIODICAL:

樹構設計除時代 (日本) (1994年) (1994年) (1994年)

Akademiya nauk SSSR. Iskusstvennyve sputniki. Zemli. No. 7, Moscow, 1961, pp. 101 - 124

TEXT: The particular feature of the motion of a body such as a rocket or satellite through the upper ionosphere is that the motion takes place in a very rarefied medium. The mean free path of the particles in this medium is very much greater than the linear dimensions of the moving body. It follows that one cannot use the usual hydrodynamic methods and the medium cannot be looked upon as continuous. The interaction of the body with the medium must be described in terms of the kinetic theory, taking into account the interaction of the body with the ions and electrons in the medium. Since the interaction of the body with the ions and electrons is not the same, the quasi-neutrality of the plasming upset and the electric field appears. The present paper is concerned with Card 1/9

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Disturbances Produced

Ine first estimates of such disturbances in the ionosphere section gives a calculation of the changes in the concentration of neutral particles in the neighbourhood of the moving body, the second section gives an analogous calculation for the electrons and ions, including the electric-field effects, while the third section gives the solution of the problem with allowance for the (constant) Earth's magnetic field. It is assumed throughout that the velocity of the body is much greater than the thermal velocity of the molecules or ions and much smaller than the thermal velocity of the electrons, order to simplify the problem, the moving body is assumed to be spherical in form. It is clear that two regions can be distinguished, namely, the region in front of the moving body; where the density is increased and the region behind the body where the density is reduced. These will be referred to as the "front" and "rear" regions. Two cases can then be distinguished, namely: 1) elastic reflection from the moving body and 2) diffuse reflection (equal probability of reflection in all directions). Formulae are derived for the two cases and

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Disturbances Produced

Fig. 2 shows a graphical representation of these results for the front region. The first plot in Fig. 2 shows the situation for the case of elastic reflection and the second plot gives the results for the diffuse reflection (R is the radius of

the body). These calculations are carried out on the assumption that the particle reached the surface of the body with a certain average velocity ${\bf v}_{_{\rm O}}$ which is representative of the appropriate

Maxwellian distribution. The results in Fig. 2 are given in the frame of reference attached to the moving body. The rear region differs in that the incident molecules can no longer be looked upon as having a certain average velocity $\mathbf{v}_{\mathbf{o}}$ and the

velocity distribution must be taken into account. This distribution is assumed to be Maxwellian. For a spherical body the density-distribution is shown graphically in Fig. 3. Calculation of the ion and electron densities and of the electric field is said to be much more difficult. The solution involves the transport equations for the ions and electrons as well as the field equation. In the first part of this Card 3/9

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Disturbances Produced

section, it is assumed that all the charged particles are reflected from the surface of the body although even with this assumption the general solution is very complicated. Since the velocity of the body is very much smaller than the average thermal velocity of the electrons, the electron velocitydistribution can be assumed to be of the form

$$n_{e0}(r, v) = n_{e0} \left(\frac{m}{2\pi kT}\right)^{7/2} \exp\left\{-\frac{mv^2}{2} + e\varphi + U\right\}.$$
 (14)

and hence the electron density is given by:

$$n_e(r) = n_{e0} \exp\left\{-\frac{e\varphi + U}{kT}\right\}. \tag{15}$$

where ϕ is the electric-field potential and U is the energy of interaction of the particles with the surface of the body.

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Disturbances Produced

Consideration of the analogous problem for the ions has led to a solution which is illustrated graphically in Fig. 4. This figure shows the equipotential surfaces in the neighbourhood of a spherical body reflecting all the particles incident upon it in the case where $|\mathbf{v}_0|/\mathbf{v}_T = 8$ (| \frac{1}{2k(r,t)} \). The quantity A shown in this figure is defined by

$$A = 2.1 \times 10^{2} n_{\frac{20}{7}} R_0^2$$
 (165) .

Fig. 5 shows the corresponding plot for the case where the surface of the spherical body imetall absorbs oil the particles incident upon it. The final section is compensed with the effects of the magnetic field. It is shown that the magnetic field has little effect on the electron concentration and the electric-field potential and home of its only decessary to consider the ion concentration. Eastellian distribution is again assumed and expressions are detired for the ion-density change. Acknowledgments are expressed to Card 5/9

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Card 6/9

GUREVICH, A.V.; TSEDILINA, Ye.Ye.

Effect of a constant electric field on electron temperature in the ionosphere, Geomag. i aer. 1 no.1:34-40 Ja-F '61.

(MRA 14:7)

1. Fizicheskiy institut AN SSSR imeni P.N. Lebedeva i Institut zemalogo magnetizma, ionosfery i rasprostraneniya radiovoln AN SSSR.

(Ionosphere) (Electrons) (Electric fields)

"APPROVED FOR RELEASE: 03/20/2001

EASE: 03/20/2001 CIA-RDP86-00513R000617410013-8

25202 \$/056/61/040/006/023/031 B108/B209

24.6710

AUTHOR:

Gurevich, A. V.

TITLE:

Peculiarities of the behavior of multiply charged ions in

a plasma

PERIODICAL:

Zhurnal eksperimental noy i teoreticheskoy fiziki, v. 40,

no. 6, 1961, 1825-1831

TEXT: It is shown that, under certain conditions, multiply charged ions in a singly ionized plasma under the action of a constant electric field move opposite to the ordinary singly charged ions. The motion of an ion with a charge eZ in a completely ionized plasma is described by the equation $Md\vec{v}/dt = eZ\vec{E} - \vec{F}_e - \vec{F}_i$ (1), where \vec{F}_e and \vec{F}_i are frictional forces

equation $Md\vec{v}/dt = eZ\vec{E} - \vec{F}_e - \vec{F}_i$ (1), where \vec{F}_e and \vec{F}_i are little to the due to the presence of electrons and ions, respectively. Introducing the expressions for the frictional forces into Eq. (1), one obtains

 $Md\vec{v}/dt = -eZ(Z-1) \vec{E} - m\vec{v}_{e0} \vec{Z}^2 \vec{v} \left[1 + \gamma/(1 + v/v_{Ti})^3)\right]$ (1a), where

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Peculiarities of the behavior...

is the effective frequency of collisions of electrons with singly charged ions in a constant electric field; the parameter γ , given by $\gamma = (\frac{1}{N_0} \frac{1}{V_0} \frac{1}{V_0})^{1/2}, \text{ is generally very great; e.g., at } T_{10} = T_e, \gamma \approx 60.8$ in deuterium, and $\gamma \approx 43$ in hydrogen. M_0 , T_{10} , and V_{T1} are, respectively, the mass, temperature, and thermal velocity of ions in the plasma. The solution of Eq. (1a) shows that the velocity of multiply charged ions, v, has two stable values in a constant electric field in the range $3\gamma^{1/3} m_{00} v_{T1} \frac{1}{Z/2} v_{00} v_{T1} v_{00} v_{0$

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Peculiarities of the behavior ...

to three orders of magnitude. The velocity of multiply charged ions (with respect to a fixed observer) is equal to $\vec{v} + \vec{v}_{i0}$ (\vec{v}_{i0} - mean velocity of singly charged ions). \vec{v} always goes in the direction of electron motion, and \vec{v}_{i0} in the opposite direction, so that a multiply charged ion may move in either direction, depending on the ratio of the velocities \vec{v} and \vec{v}_{i0} . Due to the velocity distribution of the particles, some of the ions will be in one steady state, while others are in the other steady state. The kinetic equation for the velocity-distribution function $f(\vec{v},t)$ of ions with a charge \vec{e} in a completely ionized plasma has the form

$$\frac{\partial f}{\partial t} = \frac{eZ(Z-1)E}{M} \left(\cos\theta \frac{\partial f}{\partial v} - \frac{\sin\theta}{v} \frac{\partial f}{\partial \theta}\right) - \frac{1}{v^2} \frac{\partial}{\partial v} \left\{v^2 \left[\frac{M}{M_0} v_i(v) \times \left(\frac{v}{(2kT_{i0}/M_0)^{3/4}}\right) \left(\frac{kT_{i0}}{M} \frac{\partial f}{\partial v} + vf\right) + \frac{m}{M} v_{r0} Z^2 \left(\frac{kT_e}{M} \frac{\partial f}{\partial v} + vf\right)\right]\right\} - .$$

$$- \frac{v_f(v)}{2\sin\theta} H\left(\frac{v}{(2kT_{i0}/M_0)^{3/4}}\right) \frac{\partial}{\partial \theta} \left(\sin\theta \frac{\partial f}{\partial \theta}\right) = 0. \tag{6}$$

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25202 S/056/61/040/006/023/031 B108/B209 Peculiarities of the behavior .. 0 denotes the angle between \vec{E} and \vec{v} ; $v_i(v) = 4\pi e^4 NZ^2 ln N/M^2 v^3$ stands for the frequency of collisions between multiply and singly charged ions; G(x) and H(x) are functions introduced by S. Chandrasechar (Ref. 5: Revs. Mod. Phys., 15, 1, 1943): $G(x) = \frac{1}{2}(x) - 2xe^{-x^2}/\sqrt{\pi}$, $H(x) = (1 - \frac{1}{2}x^{-2})\Phi(x)$ + $e^{-x}/\sqrt{\pi x}$; $\Phi(x)$ is the probability integral. By solving Eq. (6), the author obtains the following ratio of the number of multiply charged ions. in the second state to that of ions in the first state (in the case of equilibrium): $\frac{M v_{t}(v) G v / M_{0} + m v_{e0} Z^{2} v / M - eZ (Z-1) E / M}{v_{t}(v) G k T_{t0} / M_{0} + v_{e0} Z^{2} k T_{e} m / M^{2}}$ 50 The author thanks V. L. Ginzburg and M. A. Leontovich for valuable discussions. There are 3 figures and 8 references: 5 Soviet-bloc and 3 non-Soviet-bloc. Card 4/5

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Peculiarities of the behavior ...

Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR

(Institute of Physics imeni P. N. Lebedev of the Academy of Sciences USSR)

SUBMITTED:

ASSOCIATION:

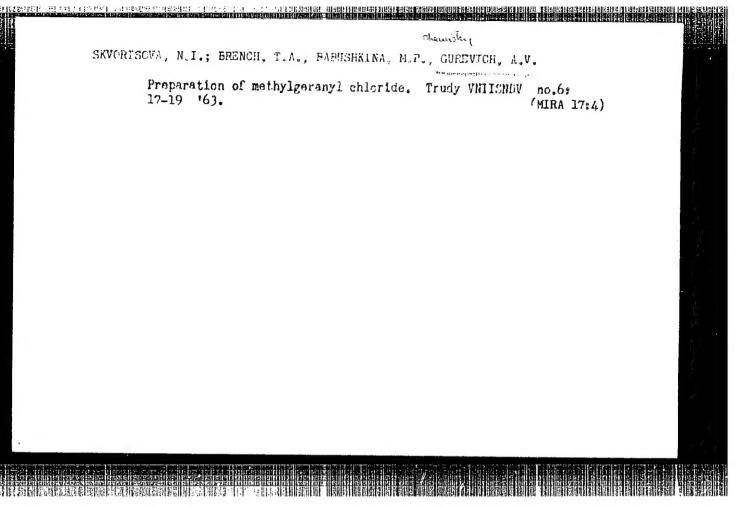
January 11, 1961

Card 5/5

GUREVICH, A. V., PITAYEVSKY, L. P., ALPERT, Ya. L.

"On Effects Produced by a Body Moving Fast in Plasma"

Soviet Papers Presented at Plenary Meetings of Committee on Space Research (COSPAR) and Third International Space Science Symposium, Washingtion, D. C., 23 Apr - 9 May 62.



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	AUTHOR:	Gurevich, A.V.
	TITLE:	The distribution of particles in a centrally symmet- ric field
	PERIODICAL:	Geomagnetizm i aeronomiya, v. 3, no. 2, 1963, 185- 203
	TEXT: Expressions for the density and flow of particles in a rarefied gas subjected to a centrally symmetric field of a body are derived and analyzed. The problem is of considerable interest in astrophysics and plasma physics, especially in the case of an in astrophysics and plasma physics, especially in the case of an interactive field. The transport equation is solved neglecting colliatractive field. The transport equation is solved neglecting collisions for the following cases: (1) Infinite orbits in an attracting sions for the following cases: (1) Infinite orbits in an field with potential U varying as 1/r2; (2) Infinite orbits in an attracting field where U varies first more slowly than 1/r2 and then attracting field where U varies first more slowly than 1/r2, more rapidly than 1/r2; (3) U varying first more slowly than 1/r2, then more rapidly, and for large r exactly as 1/r2; (4) Repulsion then more rapidly, and for large r exactly as 1/r2; (4) Repulsion field U > 0. The distribution of particles with finite orbits B	
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The distribution of particles ... S/203/63/003/002/001/027

also discussed. In each case the effect of absorption of the gas particles by the body is considered. Acknowledgements are made to Ya.L. Al'pert and L.P. Pitayevskiy for useful discussions. There are 9 figures.

ASSOCIATION: Fizicheskiy institut im. P.N. Lebedeva AN SSSR (Physics Institute im. P.M. Lebedev, AS USSR)

SUBMITTED: October 18, 1962

GUREVICH, A.V.; PITAYEVSKIY, L.P.

Diffusion approximation of disturbances around a body moving in a plasma. Geomag. i aer. 3 no.5:823-829 S-0 '63.

(MIRA 16:11)

1. Fizicheskiy institut imeni P.N.Lebedeva AN SSSR i Institut fizicheskikh problem AN SSSR.

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